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STUDIES MADE BY HUMAN RESEARCH UNIT NUMBER 1 DURING
PROJECT STALK. III. SELECTION AND TRAINING OF
STEREOSCOPIC RANGE FINDER OPERATORS

Norman Willard, Jr.

Human Resources Research Organization

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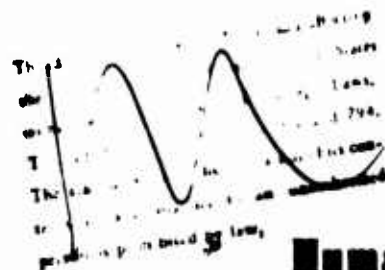
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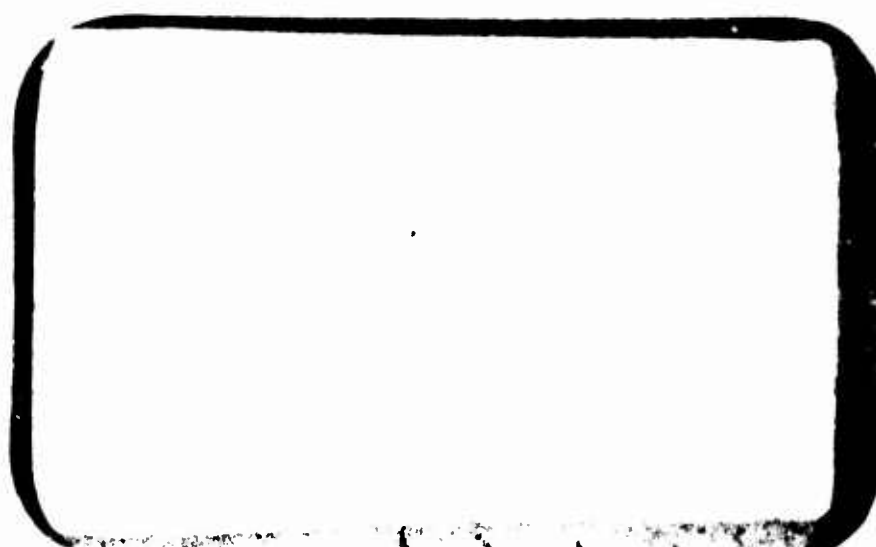
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Studies Made by Human Research Unit Nr 1
During Project STALK
III. Selection and Training
of Stereoscopic Range Finder Operators

Norman Willard, Jr.

Staff Memorandum
November 1956
(Revised Version-February 1957)

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10. Abstract (Cont.)

some group improvement was exhibited up to and beyond 1800 practice rangings. Generally the improvement beyond 1800 rangings was of neither practical nor statistical significance. Results of the proficiency tests confirmed previous findings that, independent of the extent of training, many men will not be able to qualify as operators of the stereoscopic range finder.

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Figure 1 following page 3
"Acquisition of Ranging Skill by 59 STALK Operators"

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Studies Made by Human Research Unit Nr 1, COMARC during Project STALK:
III. Selection and Training of Stereoscopic Range Finder Operators

A. Objective:

at the direction of Office, Chief of Army Field Forces (now COMARC), Human Research Unit Nr 1 assisted Ballistics Research Laboratories and Board Nr 2, COMARC in the conduct of Project STALK, September-December 1953. The Unit was directed to supervise the selection and training of the STALK stereoscopic range finder operators.¹

The requirement for Project STALK was that 25 tank crews be trained to operate each of five tank types. Two of these types (M47 and M47E1) contained gunner-operated stereoscopic range finders. One other type (M48) contained a tank commander-operated stereoscopic range finder. Each of the 25 crews was required to operate each tank type; so it was necessary to select 25 gunners and 25 tank commanders and train them to use the stereoscopic equipment. Ten alternates, five for each of the two crew positions, were also trained.

B. Procedure:

1. Selection. Originally the responsibility for assigning the STALK subjects to crew positions was that of the commanding officer of each company which provided the men for the project. Human Research Unit Nr 1 sent a research team to Camp Carson, Colorado, to give vision tests to the men so assigned. One hundred thirty-eight of these 140 crewmen were given the following tests: 1) The Bausch and Lomb Ortho-Rater, 2) the Olson Stereopsis Test, 3) the Wirt Stereopsis Test, 4) the Three Dimensional Company Test of Stereopsis, slides PV 12 and PV 13, 5) the United States Navy Interpupillometer Mark I, and 6) a practical range finder operation test.

¹Other contributions of the Unit to Project STALK have been reported:
I. Results of Interviews with the STALK Crewmen (U), draft Technical Report (CONFIDENTIAL) (Fort Knox: HRU Nr 1, October 1955; revision, April 1956).
II. Relationships Between Human Factors and Tank Crew Effectiveness (U), Staff Memorandum (CONFIDENTIAL) (Fort Knox: HRU Nr 1, May 1956).

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For selection purposes, the Aptitude Area VII score was added to the Olson Test of Stereopsis and the standard deviation (a variability measure) of the interpupillary measurement made by the subject, to produce a composite predictor score of potential ranging ability. To this predictor the ranging job sample was added to produce a final score for each operator, the job sample and the predictor being given equal weight.

The greater the scores on Aptitude Area VII and on the Olson Stereopsis Test, and the smaller the variability scores for measurement of interpupillary distance and for the ranging job sample, the higher the operator's rank would be. The rank-order of the potential operators was established by combining these four scores for each man.

These testing and ranking procedures were carried out to increase the probability that the range finder operators to be trained during the project were among the highest fifty per cent of the military population in potential ranging ability. The result of following this procedure was that several men originally assigned (by the CO) to crew positions which involved operating the range finder were reassigned to other crew positions, because it was essential that tanks equipped with range finders be handled by men who could operate the stereoscopic equipment. The procedure followed was considered an experimental control rather than a built-in bias, for personnel in a TOE unit might be expected to be similarly shuffled.

2. Training. After the sixty men had been selected, an intensive range finder training program was conducted at Camp Irwin, California under the supervision of instructor personnel from the units of the operators. Before the project formally began, the sixty potential operators made 1200 practice rangings. They continued ranging practice during every phase of STALK, and before being tested on each successive phase, they completed 600 additional

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practice rangings. In addition, each received additional field experience with the ranging instruments. Most of the ranging drill (at Camp Irwin) was conducted on instruments which had been removed from the tanks. The targets used were panel targets, six feet square, placed at the following target distances:

1	1,284 yards	5	2,618 yards
2	2,241 yards	6a	2,932 yards
3	1,733 yards	6b	2,171 yards
4	2,934 yards	7	500 yards
	ICS		1,501 yards

C. Results:

The range finder training conducted during Project STALK confirmed findings previously reported. First, stereoscopic acuity, as measured by standard tests, is related to ranging ability. Though this relationship is significant, it is low. Second, men do make gradual improvement when ranging practice is given over an extended period. But the improvement made after 1800 contacts is so slight as to be of almost no practical significance, when training is carried to 4200 range readings per man. Of the 59 men who completed the training, nearly a third reached their best level by the time they had made 150 rangings, about 70% reached their best level by 1200 rangings, and 85% by 1800 rangings. It may be concluded that for practical purposes, little improvement in ranging takes place after 1800 practice rangings. Figure 1 makes this finding clear.

A discussion of the operators' training time, however, does not state the proficiency levels they reached. The following percentages were obtained by using only the results of the ranging test given at the end of the project to the men trained: 22% of these men (9% of the original 140) would qualify by rigid Army standards; 72% would qualify if the permissible error were doubled; and 92% performed within limits equivalent to three

ACQUISITION OF RANGING SKILL BY 59 STALK OPERATORS

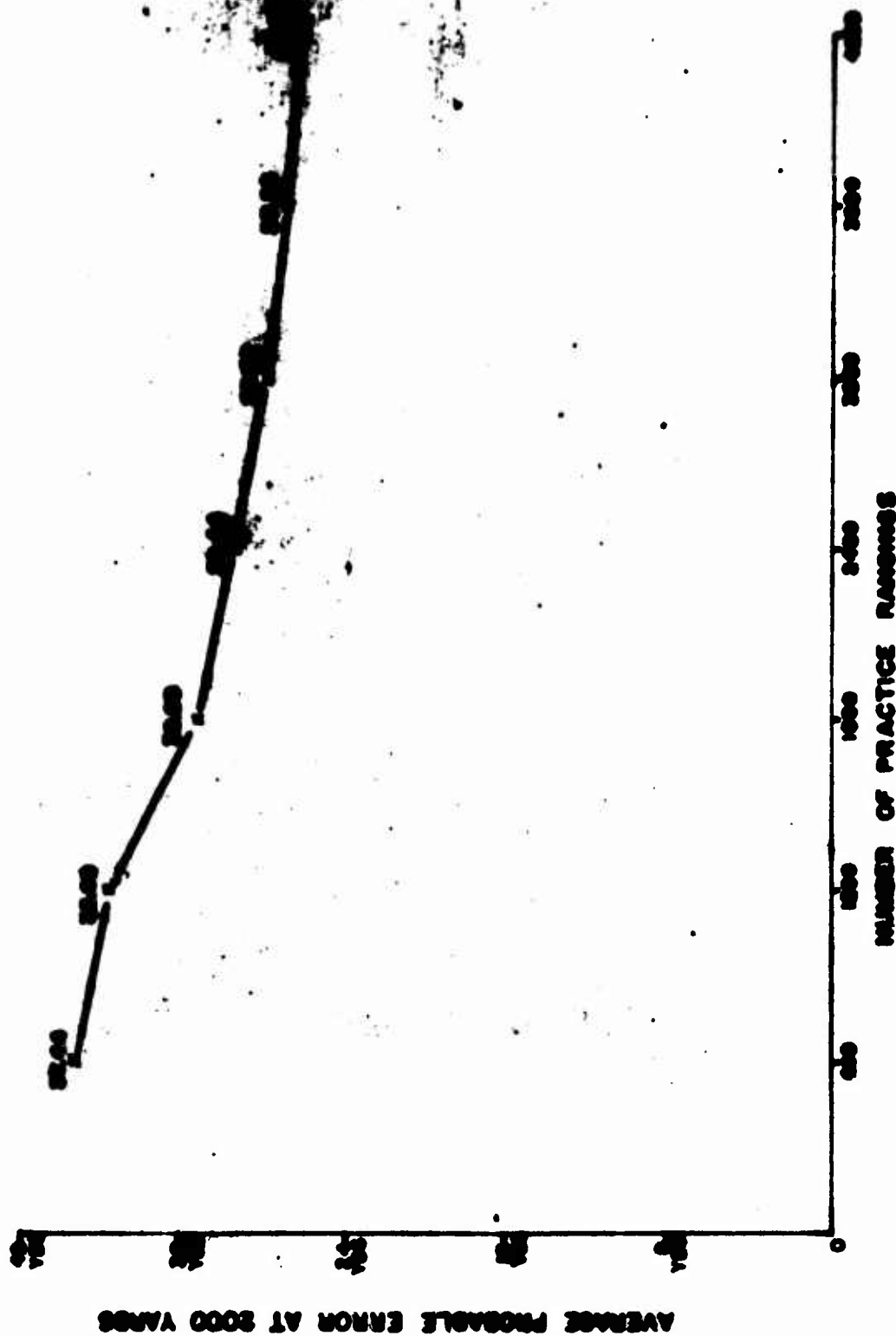


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times the acceptable error. These figures may seem higher than would normally be expected, in part, at least, because of the effectiveness of the selection procedure, the men selected being potentially the sixty best operators of the 140.

Figure 1 also shows that the average final proficiency of these 59 men, when their performance is measured by the size of their variability, is a probable error of 26.5 yards (or a standard deviation of 39.3 yards) at a target distance of 2000 yards. Because these STALK operators made 4200 practice rangings, these proficiency data are not comparable with those for an unselected group of operators trained during a previous study, RANGE-FINDER, conducted by Human Research Unit Nr 1 at Fort Knox, Kentucky in 1952. But when a subsample of the Fort Knox group was selected by the methods used to select the sixty operators for Project STALK, and when the performances of the two groups after 800 practice rangings were compared, the mean variability for the two groups was found to be very much alike: The standard deviation of the Fort Knox group was 50 yards at a target distance of 2000 yards; that of the STALK group, 48.3. The improvement of the STALK operators from a SD of 48.3 yards after 800 rangings to a SD of 39.3 after 4200 rangings may be attributable to the additional practice. Even so, on their final test, less than 25% of the STALK operators qualified by Army standards.

D. Summary:

Under the direction of OCAF, HRU Nr 1 selected and trained 60 men in the operation of the stereoscopic range finder. These men filled the crew position of gunner or tank commander in the 25 tank crews in which the STALK subjects were grouped.

Initial selection of 60 men from a group of 140 was based on the results

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of 1) Aptitude Area VII, 2) an original test of stereopsis, 3) a variability measure derived from the U. S. Navy Mark I interpupillometer, and 4) a ranging work sample. A battery of tests had been administered for research purposes, but only the four measures referred to were known to be related to final ranging skill. (Subsequent analysis of performances on the other tests in the battery indicated that there was little relationship between those tests and final ranging proficiency.)

Training in range finder operation was conducted at Camp Irwin, California using operational range finders (removed from the tank and mounted on pedestals). Each operator made 4200 practice rangings during the course of Project STALK. Proficiency tests were administered periodically during the course of STALK training.

The results indicate that one-third of the men reach their peak early (150 practice rangings) in training; that the average man has ceased to improve by about 600 readings; that by 1200 rangings over 70 per cent have reached their maximum; and that some group improvement is exhibited up to and beyond 1800 practice rangings. Generally, the improvement beyond 1800 rangings was of neither practical nor statistical significance.

The proficiency tests administered in this study confirmed previous findings that, independent of the extent of training, many men will not be able to qualify as operators of the stereoscopic range finder. By existing Army standards, less than 25 per cent of the STALK operators qualified.

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